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Original Article

Demographic and Clinical Profiles of Patients with Breast Cancer in the Jazan Region: A Descriptive Analysis

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ABSTRACT Breast cancer is a leading cause of cancer-related mortality among women worldwide. Despite the availability of national data, research on the demographic and clinical characteristics of patients with breast cancer in the Jazan region of Saudi Arabia is limited. This study aimed to address this gap by analyzing local patient profiles and treatment patterns. A retrospective review of 98 patients with breast cancer who were treated in Jazan was conducted. Key demographic, clinical, and treatment data were collected, including information regarding disease stage at diagnosis, detection method, and treatment modality. Descriptive statistics were used to summarize the data. Factor analysis was used to explore treatment patterns, and logistic regression was used to examine the factors associated with mastectomy. **Results:** The mean age of the patients was 50.18 ± 13.03 years; most patients were Saudi (76.6%), married (59.2%), and housewives (85.7%). Comorbidities were present in 46.9% of the patients. The left breast was affected in 56.8% of the patients. Only 16.3% of the cancers were detected through screening; the remaining cases were identified symptomatically. Stages 2a (18.2%) and 4 were the most common. Mastectomy was performed in 51% of the patients, followed by chemotherapy (63.3%) and hormone therapy (43.9%). Two dominant treatment clusters emerged: one centered on mastectomy and chemotherapy and the other on breast-conserving surgery, radiation, and hormone therapy. No significant predictors of mastectomy were identified in this study. Most cases of breast cancer in Jazan were diagnosed in the late stages, with low screening uptake and a high reliance on mastectomy. The predominance of non-working women among these patients challenges assumptions linking occupational exposure to the risk of breast cancer. These findings underscore the need for targeted awareness campaigns, improved screening access, and further research on the risk factors and treatment outcomes in the region.

Keywords: Breast Cancer, Mastectomy, Chemotherapy, Early Screening, Saudi Arabia.

INTRODUCTION

Recent research indicates that breast cancer has surpassed lung cancer as the most frequently diagnosed cancer in women worldwide [1]. In 2020, more than 2.3 million new breast cancer cases were reported, representing 11.7% of all newly diagnosed malignancies. Regrettably, breast cancer was also responsible for 684,996 deaths in 2020 [2]. Breast cancer mortality rates differ substantially between transitioning and developed nations, with transitioning countries exhibiting higher rates [3]. The most commonly diagnosed malignancies in the Kingdom of Saudi Arabia (KSA) include breast, colorectal, and prostate cancer [4]. The incidence of breast cancer has been reported to be 14.8%, with a cumulative risk of 2.87% in both males and females [5]. In 2018, the prevalence of breast cancer in females was 29.7%. More than 50% of breast cancer cases in the KSA are identified at an advanced stage, in contrast to 20% in wealthy nations [6].

Multiple risk factors contribute to the onset of breast cancer in women, including reproductive and hormonal influences, tobacco use, lifestyle decisions, and genetic predispositions [7]. Approximately 8%–10% of breast tumors are linked to

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harmful genetic mutations, with BRCA1/2 mutations representing 50% of these cases. Gene variants are categorized as high-, moderate-, and low-penetrance, and risk-reducing surgery may be considered on the basis of the level of penetration [8]. Furthermore, screening for hereditary BRCA1/2 mutations is essential to identify individuals who might benefit from targeted therapies, such as poly (ADP-ribose) polymerase inhibitors or platinum-based agents [9,10]. A Saudi study evaluating the incidence of BRCA1 and BRCA2 mutations in 310 individuals found that 87% had no mutations, 11% had BRCA1 mutations, and 2% had BRCA2 alterations [11]. Triple-negative breast cancer (TNBC) was observed in 86% of the individuals with mutations [12].

The Jazan region, located in southwestern Saudi Arabia, is home to over 1.6 million people, with a significant proportion residing in rural areas and having limited access to specialized healthcare services. Despite improvements in national cancer care in Saudi Arabia, region-specific data are lacking. Breast cancer remains a major health concern in Saudi Arabia, but research exploring the demographic and clinical profiles of patients in underserved areas such as Jazan is limited [2]. Existing studies have often focused on national datasets and overlooked localized factors that influence disease presentation, progression, and access to treatment [13].

This study aimed to bridge this gap by comprehensively analyzing patients with breast cancer in the Jazan region. The findings will provide valuable insights into patient demographics, tumor characteristics, and treatment patterns. Understanding these regional trends is essential for designing effective, evidence-based interventions tailored to the unique needs of this population. These findings aim to support public health initiatives, enhance early detection efforts, improve access to optimal care, and guide policymaking to reduce the regional cancer burden. By identifying the critical factors and disparities, this study will contribute to broader efforts to reduce breast cancer morbidity and mortality in Saudi Arabia.

MATERIALS AND METHODS

Study Area

This study was conducted in the Jazan region in the southwestern part of Saudi Arabia. Jazan has unique demographic and cultural characteristics with a diverse population that includes both urban and rural communities. Healthcare facilities in the region include specialized centers that provide diagnostic and treatment services for patients with breast cancer.

Study Design and Sample Size

This descriptive, cross-sectional study aimed to analyze the demographic and clinical profiles of patients with breast cancer. This design provided a snapshot of the characteristics of the population under study, focusing on the patterns and trends in disease presentation and management. This study included 98 patients with breast cancer who were diagnosed and treated at healthcare facilities in the Jazan region. The sample size was not based on a statistical power calculation but was determined by the total number of eligible cases available in institutional medical records during the defined data collection period. Participants were selected using a non-probability convenience sampling method, ensuring that they met the inclusion criteria such as a confirmed diagnosis of breast cancer and the availability of complete medical records. Data for certain variables, such as weight, tumor side, and cancer stage, were missing for 10 patients owing to incomplete documentation, which is reflected in the corresponding tables.

Study Measures

Data collection focused on key variables, including demographic characteristics (age, weight, marital status, nationality, and occupation), clinical features (tumor side, stage, duration of illness, and comorbidities), and management approaches (mastectomy, chemotherapy, radiotherapy, and other treatments). These data were extracted from patients' medical records and standardized data collection forms.

Data Quality

To ensure accuracy, the data were cross-checked by multiple researchers and verified against the original medical records. Missing or inconsistent data were addressed through follow-up assessments with healthcare providers. A pilot review of the data collection forms was conducted to refine the process and ensure comprehensiveness.

Analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Frequencies and percentages were calculated for categorical variables, whereas means and standard deviations were reported for continuous variables. Associations between variables were examined using chi-squared tests and logistic regression, where appropriate. Logistic regression analysis was performed to assess the effects of demographic factors on mastectomy (the dependent variable). Principal component analysis was conducted to identify patterns in the cancer management plans. All statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 25.0, (Released 2017; IBM Corp., Armonk, NY, USA) to ensure methodological rigor and reproducibility.

RESULTS

Demographic Characteristics

This study focused on the demographics and characteristics of a sample of 98 patients with breast cancer from the Jazan region. Table 1 presents the demographic profiles of the study population. The average age of the patients was 50.18 years, with nearly equal representation of those aged 31-50 years (46.9%) and those aged >50 years (48%). Regarding weight distribution, the majority of patients were in the 56–

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70-kg range (42.1%). Most patients were Saudi nationals (77.6%). Marital status varied, with the majority being married (59.2%). Among the patients, 28.6% reported having no children, and a substantial proportion (85.7%) were housewives. Comorbidities, including hypertension (10.2%) and diabetes (7.1%), were present in 46.9% of the patients. Additionally, 15.3% of the patients had multiple comorbidities.

Table 2 focuses on the breast cancer characteristics of the study participants. A higher proportion of tumors was found on the left side (56.8%) than on the right side (43.2%). Most patients (83.7%) discovered their condition through diagnosis rather than screening. Cancer staging data showed a diverse spread, with 18.2% of cases each showing stage 2a and stage 4 disease. Benign tumors accounted for 10.2% of the cases. The duration of illness among the patients varied significantly, with an average duration of 17.94 months, a minimum of 2 months, and a maximum of 132 months.

Table 1: Sociodemographic characteristics of the participants

Variable	**N**	**%**
Age (50.18 ± 13.03 yr)		
Less than 30 yr	5	5.1
31-50 yr	46	46.9
More than 50 yr	47	48.0
Weight (67.06 ± 14.30 kg)		
less than 50 kg	15	19.7
51-70 kg	32	42.1
More than 70 kg	29	38.2
Nationality		
Saudi	76	77.6
Non-Saudi	22	22.4
Marital status		
Single	13	13.3
Married	58	59.2
Widowed	16	16.3
Divorced	11	11.2
Children		
No kids	28	28.6
1-3 kids	26	26.5
4-7 kids	26	26.5
More than 7 kids	18	18.4
Occupation		
Housewife	84	85.7
Employed	14	14.3
Comorbidity		
None	52	53.1
At least one comorbidity	46	46.9
Types of diseases		
None	52	53.1
Hepatitis B virus infection	2	2.0
Hypertension	10	10.2
Diabetes	7	7.1
Multiple comorbidities	15	15.3
Others	12	12.2
Total	98	100

The management plans outlined in Table 3 reveal a multifaceted approach to breast cancer treatment. Mastectomy was performed in 51% of the patients, while 15.3% underwent partial mastectomy. Chemotherapy was the most frequently used treatment (63.3%), followed by hormone therapy (43.9%) and radiotherapy (39.8%). Other treatment modalities, such as immunotherapy (12.2%) and various less common interventions, were also applied. These findings highlight the diverse management strategies employed in breast cancer care in the Jazan region.

Table 2: Characteristics of breast cancer

Variable	N	%
Tumor side		
Left	50	56.8
Right	38	43.2
How did the patient come to know about the disease		
Screening	16	16.3
Diagnosis	82	83.7
Stage		
Stage 1(T1N0M0)	5	5.7
Stage 2a (T2N0M0)	16	18.2
Stage 2b (T2N1M0)	15	17.0
Stage 3a (T2N2M0)	16	18.2
Stage 3b (T4bN2M0)	7	8.0
Stage 3c (T2N3M0)	4	4.5
Stage 4	16	18.2
Benign	9	10.2
Duration		
Mean ± standard deviation	Maximum	Minimum
17.94±18.98	132.00	2.00

Table 3: Management plans

Management	**Number (N)**	**Percentage (%)**
Mastectomy	50	51
Partial mastectomy	15	15.3
Benign excision	2	2.0
Chemotherapy	62	63.3
Radiotherapy	39	39.8
Hormone therapy	43	43.9
Anti-hormonal therapy	1	1.0
Immunotherapy	12	12.2
Aspirate of cyst	1	1.0
Biological therapy	1	1.0
Anti-breast cancer	1	1.0

Factor Analysis

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.615; this value indicated a high level of suitability for factor analysis, since values less than 0.5 indicate that the data may not be adequately factorable. Bartlett's Test of Sphericity showed significant results (χ^2 = 70.450, df = 10, $p < 0.001$), suggesting that correlations among the variables were sufficient to proceed with factor

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analysis. The analysis yielded two components with eigenvalues greater than 1, explaining a cumulative variance of 60.85%. Component 1 accounted for 32.93% of the variance, whereas Component 2 accounted for 27.92%. Thus, the two extracted factors explained most of the variation in the dataset, with three additional components contributing minimally to the variation. The rotated matrix using Varimax with Kaiser normalization revealed the following loadings: mastectomy (0.880) and chemotherapy (0.627) loaded strongly on Component 1, whereas partial mastectomy (0.764) and radiotherapy (0.667) loaded strongly on Component 2. Hormone therapy resulted in moderate cross-loading of both components. The rotation converged in three iterations, confirming the structure presented in Table 4. These results suggest two distinct underlying factors related to treatment modalities: one focused on surgical and systemic therapies, and the other on combination treatments.

Table 4: Factor Analysis

	Components	
	1	2
Mastectomy	0.880	-0.148
Chemotherapy	0.627	0.116
Partial mastectomy	-0.429	0.764
Radiotherapy	0.537	0.667
Hormone therapy		0.577

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization

Logistic Regression Analysis

The logistic regression analysis revealed no statistically significant predictors of mastectomy among the examined variables (Table 5). Women with more children showed lower odds of undergoing mastectomy than those with no children; however, these results were not significant. Similarly, marital status, weight, nationality, occupation, tumor side, and comorbidities showed varying odds ratios but lacked statistical significance. Widowed women had the highest odds of mastectomy (OR = 9.82), and non-Saudi women (OR = 4.53) and patients with comorbidities (OR = 3.70) also showed higher odds of mastectomy, although these associations were not significant due to wide confidence intervals. Tumor characteristics, including the side and method of diagnosis, and patient age did not significantly influence the likelihood of mastectomy. Duration of illness was also not significantly associated. These results indicate that other factors not included in this analysis may play a critical role in determining the likelihood of mastectomy in this population.

Table 5: Logistic regression analysis (dependent variable: mastectomy)

Variables	Categories	P-value	Odds ratio		
			Value	Lower 95%	Upper 95%
Number of children	No Kids (Reference)				
	1-3 kids	0.37	0.40	0.05	2.97
	4-7 kids	0.19	0.23	0.03	2.07
	More than 7 kids	0.19	0.22	0.02	2.16
Marital status	Single (Reference)				
	Married	0.68	1.73	0.13	23.68
	Widowed	0.17	9.82	0.39	250.03
	Divorced	0.85	0.77	0.05	11.87
Weight	Less than 50 kg (Reference)				
	56-70 kg	0.27	2.83	0.45	17.65
	More than 70 kg	0.73	0.70	0.10	5.09
Nationality	Saudi (Reference)				
	Non-Saudi	0.11	4.53	0.72	28.39
Breast cancer diagnosis	Screening (Reference)				
	Diagnosis	0.70	1.44	0.22	9.41
Occupation	Housewife (Reference)				
	Employed	0.28	0.38	0.07	2.21
Side of tumor	Left (Reference)				
	Right	0.13	0.36	0.09	1.35
Comorbidity	None (Reference)				
	At least one comorbidity	0.10	3.70	0.77	17.73
Age	31–50 yr (Reference)				
	More than 50 yr	0.21	0.36	0.07	1.79
Duration months		0.45	1.01	0.98	1.04

Dependent variable encoding: No, 0; Yes, 1.

DISCUSSION

Breast cancer continues to be one of the most common cancers globally, and requires an in-depth understanding of tumor attributes and therapeutic approaches. This study presents an overview of breast cancer demographics, tumor characteristics, and treatment modalities in 98 patients in the Jazan region. The average age of the participants was 50.18 years, and the study population predominantly consisted of Saudi nationals and housewives. Clinical diagnosis accounted for the majority of cases (83.7%), as opposed to routine screening, with the most common cancer stages being 2a and 4 (18.2% each). The primary treatment was mastectomy (51%) followed by chemotherapy (63.3%) and radiotherapy (39.8%). The mean age of 50.18 years in this study was somewhat lower than that reported in Western studies, where breast cancer is often diagnosed in patients over 60 years of age [14]. Nevertheless, it closely corresponds to the data from Saudi Arabia and other Middle Eastern nations [15-17]. Using data from the Saudi Cancer Registry for the years 2001 to 2017, Basudan indicated that the median age at diagnosis had increased to 51 years,

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correlating with the ongoing transition to a more Westernized lifestyle in Saudi Arabia [18]. Al Zomia et al. recently reported that the average age at breast cancer diagnosis in Saudi women was 45–49 years [5]. Thus, breast cancer starts earlier in this region than in Western populations. This could be due to genetic factors or lifestyle choices. This could also be because the Saudi population is mostly young (with a median age of 28 years and over 30% under 18 years) rather than a biologically different condition. Two-thirds of the participants were married, aligning with findings from the Saudi Cancer Registry and data on female breast cancer from 1990 to 2021, which indicated that married women constituted the majority of patients with breast cancer [5, 18]. Conversely, research in Western populations indicated a higher incidence of breast cancer among unmarried and childless women. Although two-thirds of patients with breast cancer in this study were married, this may reflect general demographic trends rather than a clear causative association. Marriage may be correlated with access to healthcare, reproductive history, and lifestyle factors, all of which can affect the risk of breast cancer and diagnostic trends. Future studies should investigate the effect of marital status on breast cancer outcomes, treatment adherence, and psychological resilience. Our findings showing that one-third of the patients were childless raises questions about whether nulliparity or late childbearing may influence the risk of breast cancer, a trend also noted in Middle Eastern studies [16].

A significant number of patients with breast cancer in this study were housewives (85.7%), which contradicts several prior studies stating that that job exposure and workplace-related stress enhance breast cancer risk [19]. In Saudi Arabia, a substantial majority of women, especially those in the older age groups, choose to stay at home because of their traditional family responsibilities and lower rates of female labor participation. Housewives may show greater levels of physical inactivity than working women, who participate in more regular exercise and scheduled activities. These variables, in addition to the fact that 83.7% of the cases in this study were identified via diagnosis rather than screening, imply that many housewives may have skipped regular tests, perhaps contributing to the greater reported prevalence of breast cancer in this group. Our study revealed that screening identified only 16.3% of the cases, whereas symptoms led to the diagnosis in the remaining 83.7%. This low uptake of mammography, despite national screening initiatives, aligns with the findings of previous studies [20, 21] reporting that Saudi women were more likely to receive an advanced-stage breast cancer diagnosis than women in Western countries. However, another study revealed that an increasing proportion of cases were identified in earlier stages [22]. Early detection through breast cancer screening programs is likely to have contributed to this finding. In contrast, nations with well-established screening programs (e.g., the U.S., Canada, and parts of Europe) report higher screening rates, leading to earlier-stage diagnoses and decreasing breast cancer–associated mortality by 20%-30% [23]. This highlights the critical need for enhanced breast cancer awareness and increased participation in screening in Jazan and other underprivileged communities. The breast cancer staging data in our analysis indicated a large number of late-stage diagnoses, with stages 3 and 4 accounting for over 40% of the cases. This correlates with evidence from sub-Saharan African countries, Saudi Arabia, and other Gulf countries, where advanced-stage presentation is more prevalent than in Western nations [5, 24, 25]. In contrast, European and North American studies have revealed a larger percentage of stage 1 and 2 diagnoses owing to successful early detection programs [25, 26]. Mastectomy was the predominant surgical intervention (51%), exceeding the rates documented in many studies from the US [27] while aligning with those from Saudi Arabia and other Gulf countries [5, 25, 28, 29]. The preference for mastectomy over breast-conserving surgery (BCS) in Saudi Arabia may stem from patient and physician preferences, insufficient knowledge, or apprehensions over recurrence. Research from the United States and Europe indicates increased BCS rates, which are indicative of enhanced patient information and the availability of reconstructive surgical alternatives [27]. These results highlight the need for more initiatives to address spatial inequalities in breast cancer treatment. Logistic regression failed to reveal any significant predictors of mastectomy, possibly because of the limited sample size or unmeasured covariates. Nonetheless, non-Saudi women, widowed patients, and those with comorbidities had increased probabilities of undergoing mastectomy, but the differences were not statistically significant. Other Middle Eastern studies have reported similar patterns, wherein socioeconomic and cultural variables influence surgical choices [16, 28]. Conversely, Western studies have suggested that tumor size, receptor status, and genetic variables significantly influence surgical choices [27]. Chemotherapy is crucial for enhancing patient outcomes and is a fundamental component of contemporary cancer treatment, despite its possible adverse consequences [30]. Our analysis revealed that chemotherapy was the most commonly used treatment modality (63.3%), consistent with findings from Saudi Arabia, Algeria, Jordan, and Egypt, where late-stage presentations contributed to the elevated use of chemotherapy [31]. The lower rates of hormone therapy (43.9%) and radiation (39.8%) suggest that a variety of treatment protocols and administrative procedures are needed to obtain these treatments, which may reflect the influence of tumor subtypes and healthcare accessibility [32]. The results of factor analysis highlighted two different groups of treatment methods. One group focused on aggressive surgical and systemic interventions such as mastectomy and chemotherapy. The other group focused on less invasive or adjuvant methods such as partial mastectomy and radiotherapy. This pattern aligns with trends noted in both local and global studies, where surgical and systemic treatments prevailed in advanced cases, whereas conservative therapy was favored in earlier stages [31, 32]. These classifications provide important insights into

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treatment priorities and regional preferences, illustrating the clinical and resource-based dynamics of breast cancer therapy in Jazan.

Strengths and Limitations of the Study

One strength of this study is the extensive assessment of tumor staging and treatment techniques, which provided a real-world perspective on regional management trends. The survey also discusses comorbidities and healthcare access, highlighting the major impediments to early identification and treatment.

Another strength of this study is its focus on the Saudi population, which provided localized data that can contribute to regional healthcare planning and cancer awareness programs. Many international studies have focused on Western populations, where lifestyle, access to healthcare, and genetic predispositions may differ. This study also explored the roles of screening- versus diagnosis-based detection, emphasizing the need for enhanced early detection programs. Furthermore, the use of factor analysis and logistic regression added quantitative depth to the findings, potentially revealing patterns in treatment choices.

Nevertheless, this study also had several limitations. The sample size (n = 98) limited generalizability and reduced the statistical power for inferential analyses, such as logistic regression. The absence of a control group and reliance on hospital-reported cases may have introduced selection bias and overrepresented cases of advanced-stage disease. Key factors, such as genetics, lifestyle, and long-term outcomes, were not assessed. Additionally, the use of non-probability convenience sampling may have further restricted generalizability. Future studies should adopt probability-based multicenter designs and explore broader risk factors to enhance their clinical relevance.

CONCLUSIONS

This study identified key demographic and clinical trends among patients with breast cancer in the Jazan region, including a predominance of late-stage diagnoses, low screening rates, and a high reliance on mastectomy. These findings indicate major gaps in early detection and access to preventive care. In comparison with global benchmarks, the data reflect the ongoing challenges in timely diagnosis and comprehensive treatment delivery. The study also revealed two distinct patterns in treatment modalities, indicating opportunities for personalized evidence-based care. Practically, these insights can inform targeted surgical training initiatives to better manage advanced-stage cases, guide the allocation of diagnostic and surgical resources, and shape patient education programs that focus on early symptom recognition and screening awareness. To address these challenges, healthcare policies should prioritize community-based screening programs, provider training, and enhanced access to diagnostic and therapeutic services. Future research should include larger multicenter studies to validate these findings and explore the predictive factors for treatment decisions, thereby contributing to the advancement of precision oncology in Saudi Arabia.

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Jazan Health Ethics Committee - Jazan Ministry of Health (Reference No. 23106, 01 September 2023). The study was conducted in accordance with the national ethical guidelines.

INFORMED CONSENT STATEMENT

A waiver of consent was granted because the data were extracted from patient medical records.

DATA AVAILABILITY STATEMENT

Data supporting the reported results can be obtained from the corresponding author on reasonable request.

PATENTS

Not applicable

SUPPLEMENTARY MATERIALS

Not applicable

AUTHOR CONTRIBUTIONS:

Conceptualization: Jobran M Moshi, Siddig Ibrahim Abdelwahab, and Osama Albasheer; methodology: Siddig Ibrahim Abdelwahab; software: Manal Mohamed Elhassan Taha; validation: Wafa Khudier and Raya M Badri; formal analysis: Osama Albasheer; investigation: Jobran M Moshi; resources: Jobran M Moshi; data curation: Jobran M Moshi, Siddig Ibrahim Abdelwahab, and Osama Albasheer; writing—original draft preparation: Jobran M Moshi, Siddig Ibrahim Abdelwahab, Ali Shubaili, and Osama Albasheer; writing—review and editing: Mayssa S. Nadeem, Maha A Hummadi, and Sama M Maashi; visualization: Jobran M Moshi, Siddig Ibrahim Abdelwahab, and Osama Albasheer; project administration: Maha A Hummadi and Sama M Maashi; funding acquisition: Jobran M Moshi. All the authors have read and agreed to the published version of this manuscript.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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